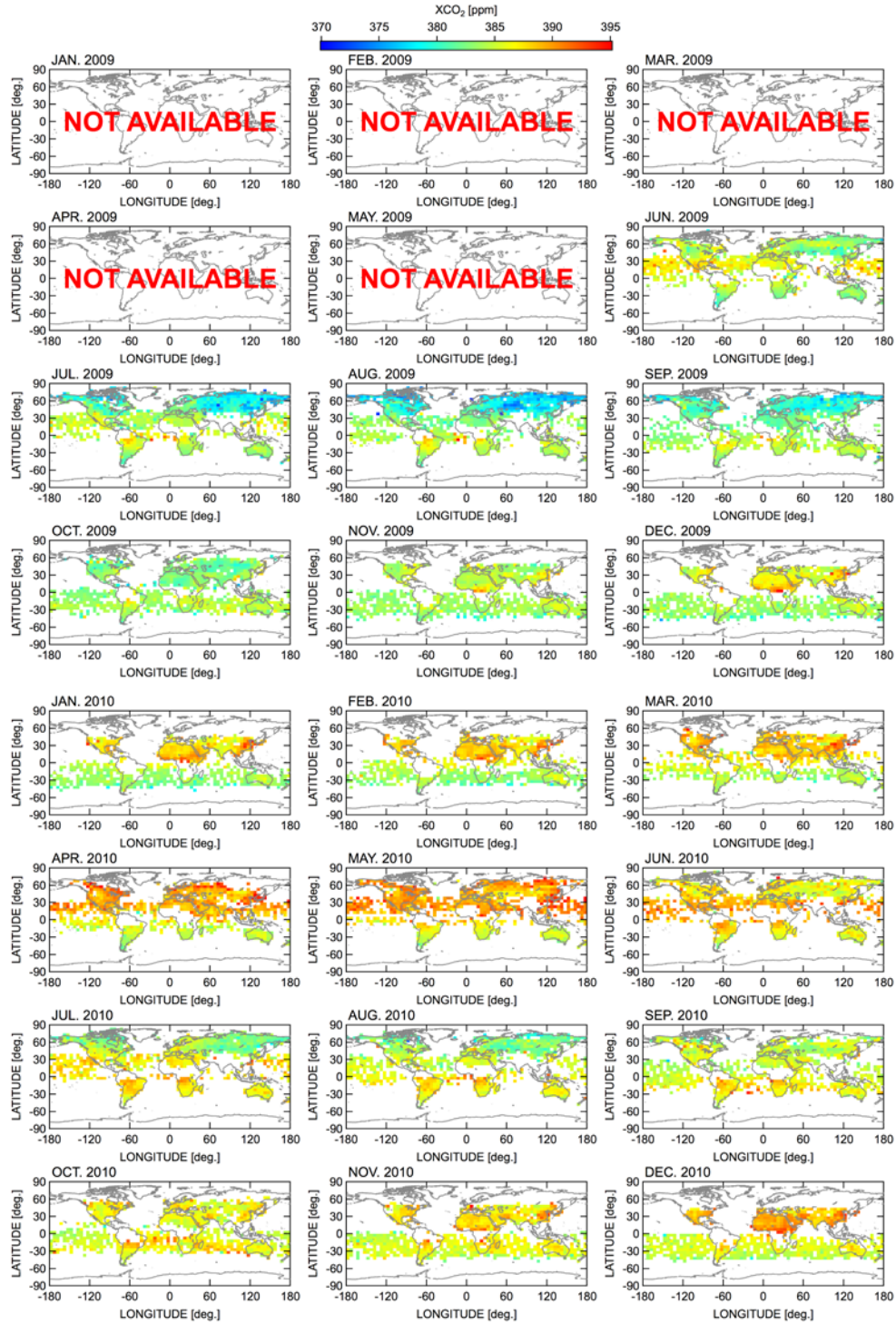


Supplementary materials

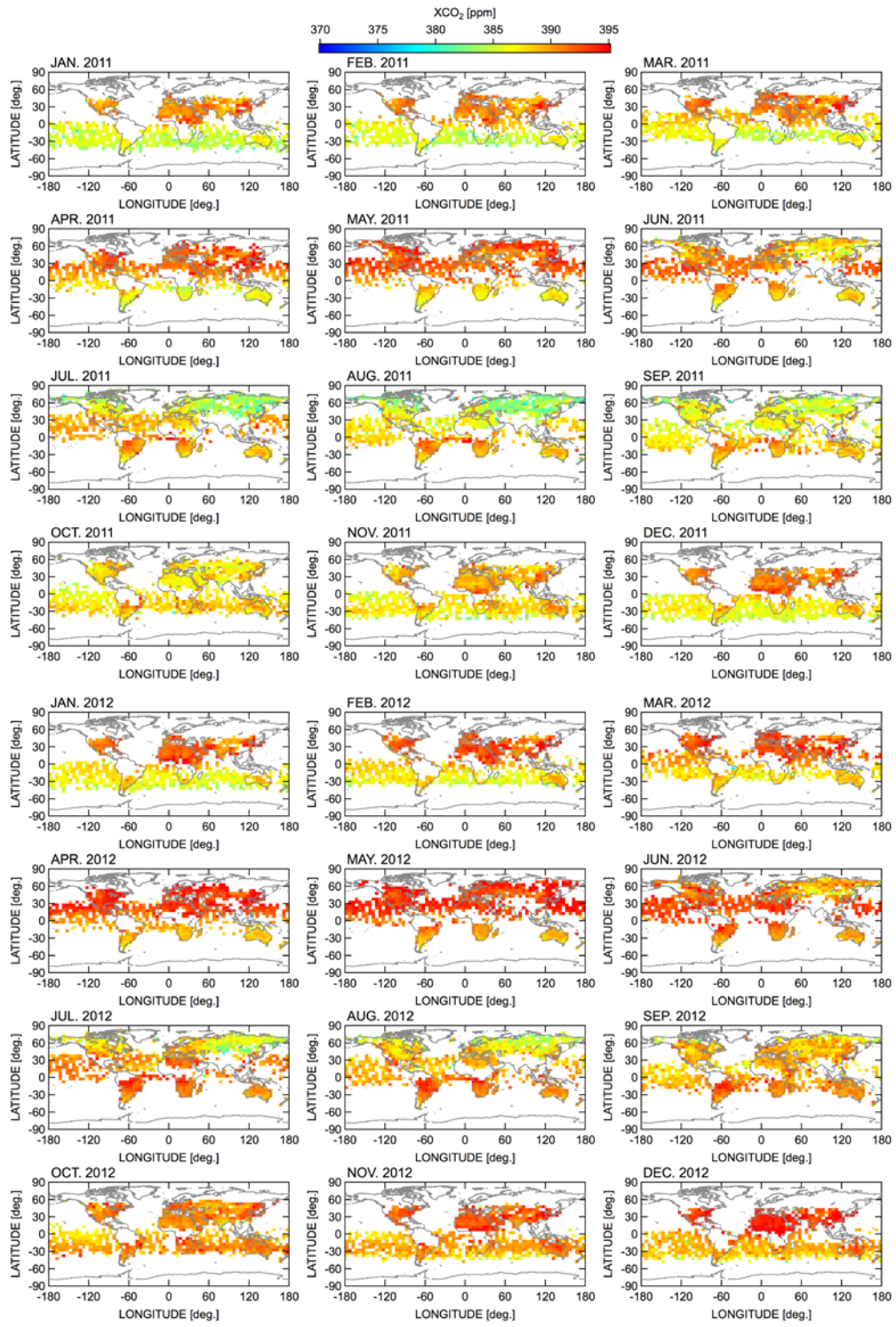
Table 1. Summary of the comparison between SWIR L2 V02.xx products and TCCON measurements (GGG2012) for whole available period. All available data are used. The GOSAT data are retrieved within a ± 5 degree latitude/longitude box centered at each TCCON site and TCCON data are the mean values measured within ± 30 min. of GOSAT overpass time. N , A , and σ indicate number of matched data, average of their differences (station bias), and standard deviation of their differences. Average and standard deviation of the station bias is also shown at the bottom of the table.

Site	Latitude [deg.]	Longitude [deg.]	GOSAT - TCCON (GGG2012) whole available period					
			XCO ₂			XCH ₄		
			N	A [ppm]	σ [ppm]	N	A [ppb]	σ [ppb]
Eureka	80.05	-86.42	5	-1.49	0.98	5	10.3	10.2
Sodankyla	67.37	26.63	70	-0.86	2.14	70	-6.6	13.0
Bialystok	53.23	23.03	34	-1.63	1.81	34	-2.5	13.1
Bremen	53.10	8.85	11	-0.55	2.19	11	0.6	12.1
Karlsruhe	49.10	8.44	50	-1.39	2.03	50	-7.1	11.7
Orleans	47.97	2.11	66	-1.62	1.81	66	-5.0	10.7
Garmisch	47.48	11.06	87	-0.32	2.01	87	7.9	13.0
Park Falls	45.95	-90.27	303	-1.31	2.09	303	-0.8	13.5
Lamont	36.60	-97.49	1255	-2.23	1.68	1255	-7.8	13.3
Tsukuba	36.05	140.12	106	0.70	2.51	106	2.7	12.0
Darwin	-12.42	130.89	161	-2.35	1.69	161	-12.6	9.5
Wollongong	-34.41	150.88	327	-1.30	2.15	329	-12.3	14.7
Lauder	-45.04	169.68	37	-1.73	2.54	43	-6.4	15.2
Total (single scan)			2512	-1.72	2.03	2520	-6.6	14.0
Total (station bias A)			13	-1.24	0.82	13	-3.0	7.0



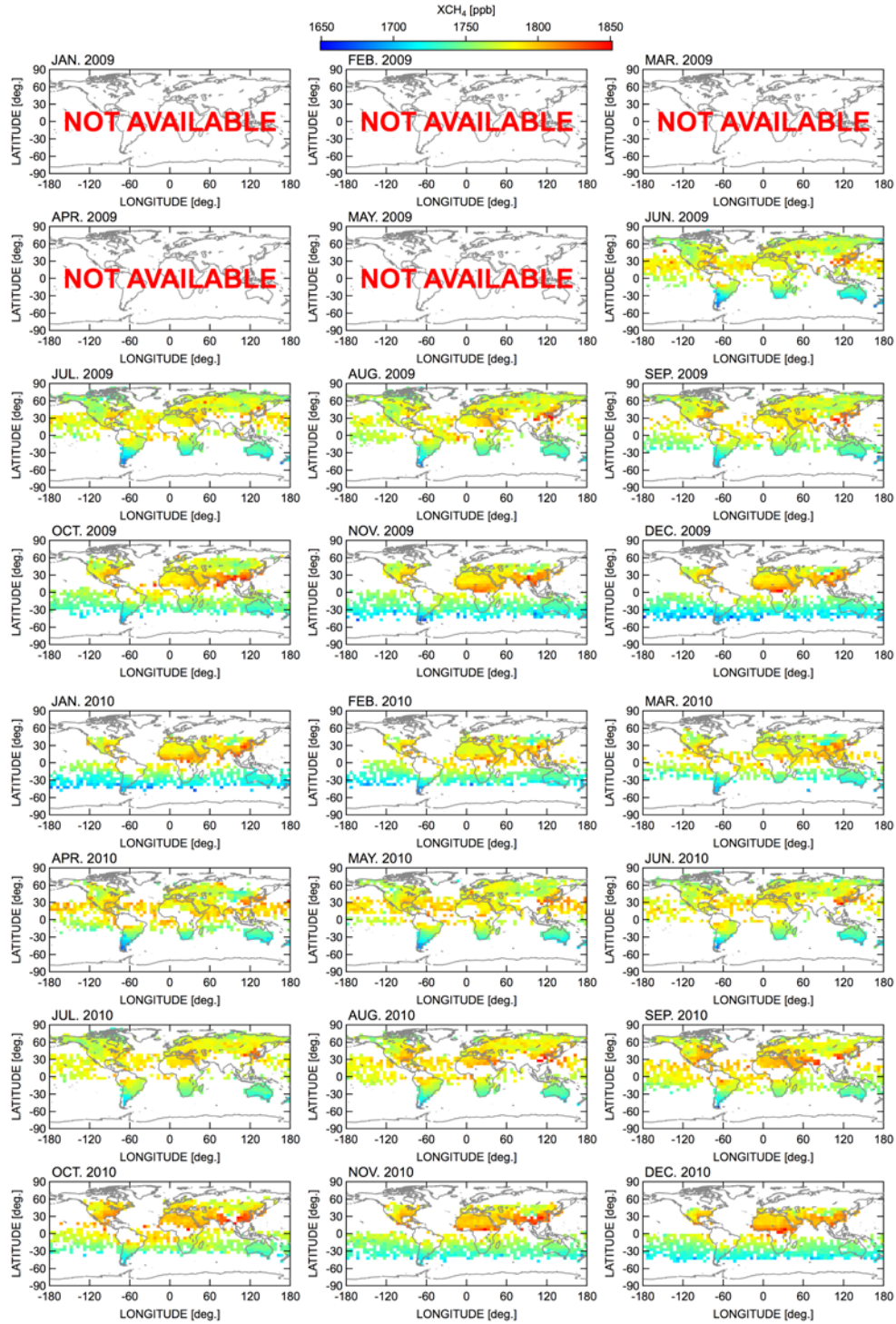
1

2 Fig. 1. Monthly averages of the retrieved XCO₂ within 5 x 5 degree grid boxes. A
 3 blank indicates that no valid retrieval result was available within the grid box.



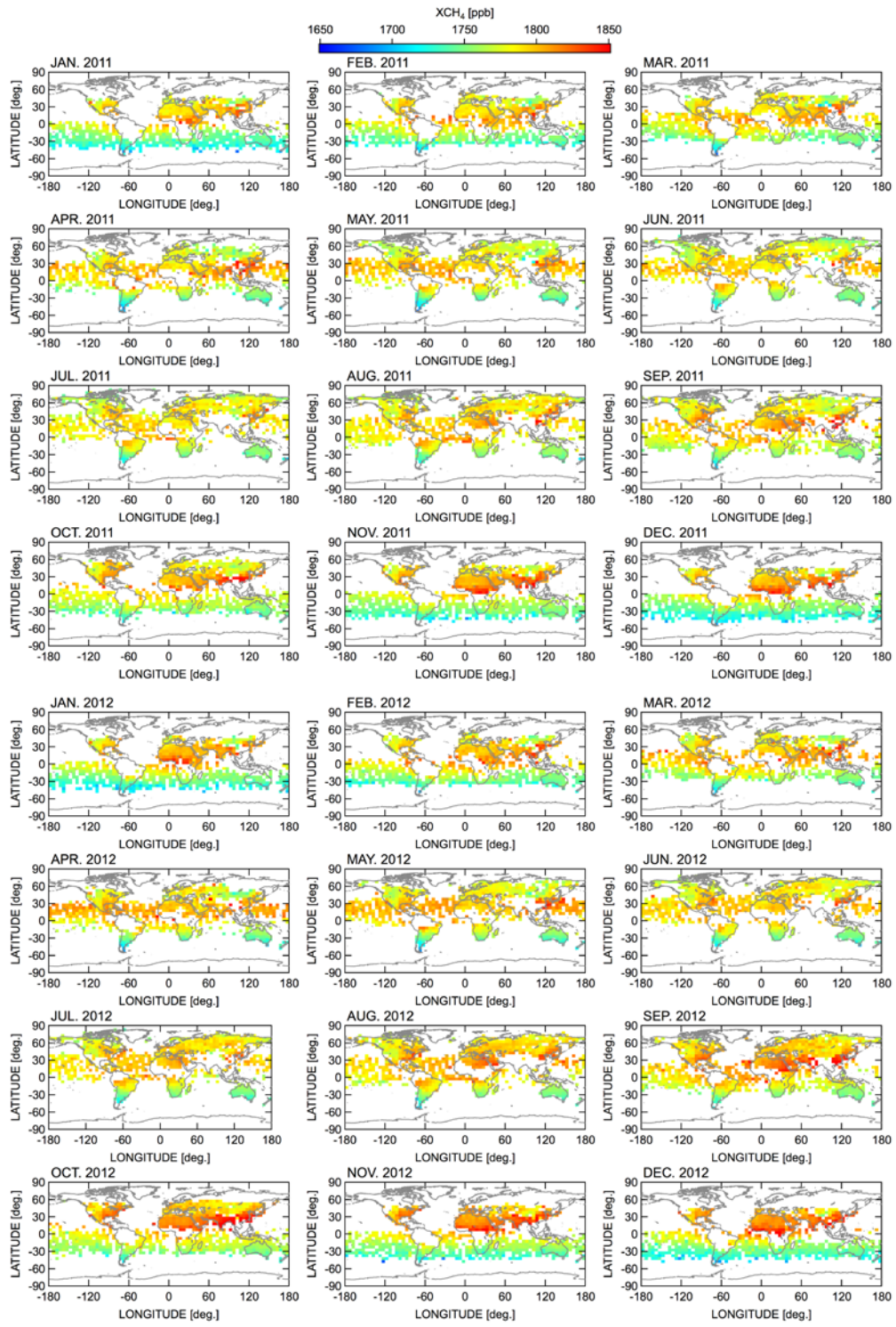
1

2 Fig. 1. Continued.



1

2 Fig. 2. Monthly averages of the retrieved XCH₄ within 5 x 5 degree grid boxes. A
 3 blank indicates that no valid retrieval result was available within the grid box.



1

2 Fig. 2. Continued.

3

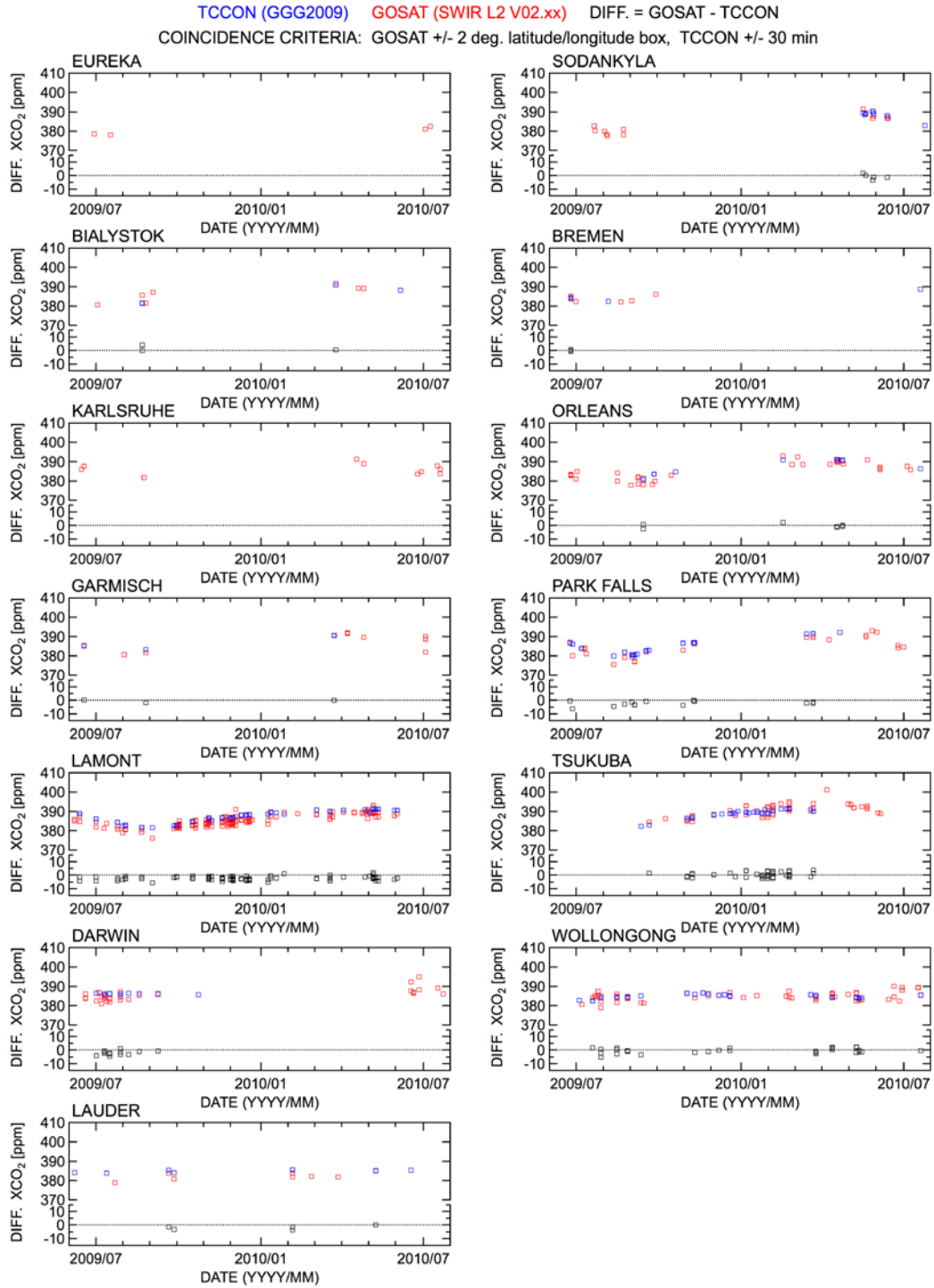


Figure 3. Time series of the SWIR L2 V02.xx and TCCON XCO₂ (GGG2009) and their difference for each TCCON site. Only the matched data until July 2010 are used. The GOSAT data are retrieved within a ± 2 degree latitude/longitude box centered at each TCCON site and TCCON data are the mean values measured within ± 30 min of GOSAT overpass time.

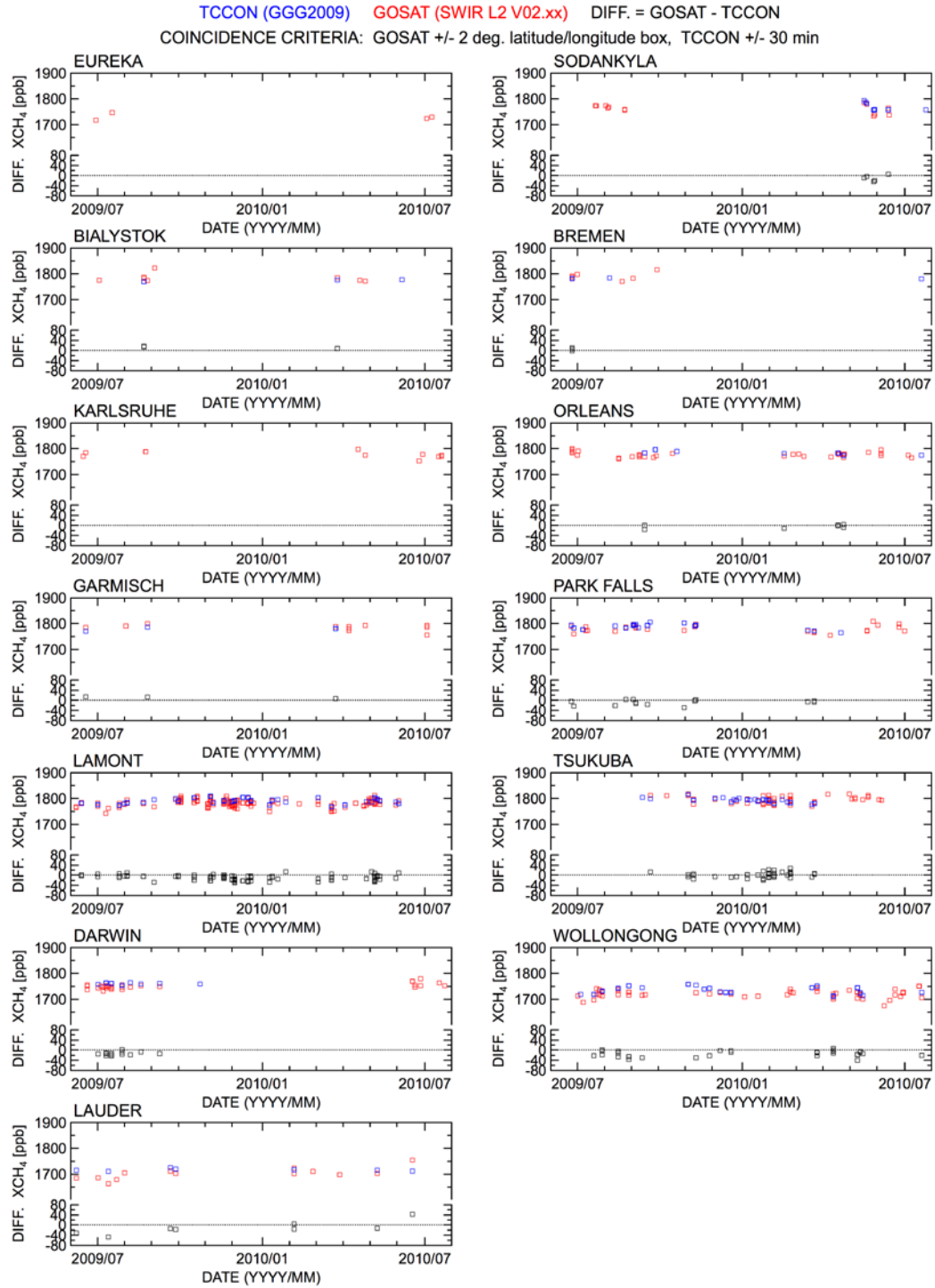


Figure 4. Time series of the SWIR L2 V02.xx and TCCON XCH₄ (GGG2009) and their difference for each TCCON site. Only the matched data until July 2010 are used. The GOSAT data are retrieved within a ± 2 degree latitude/longitude box centered at each TCCON site and TCCON data are the mean values measured within ± 30 min of GOSAT overpass time.

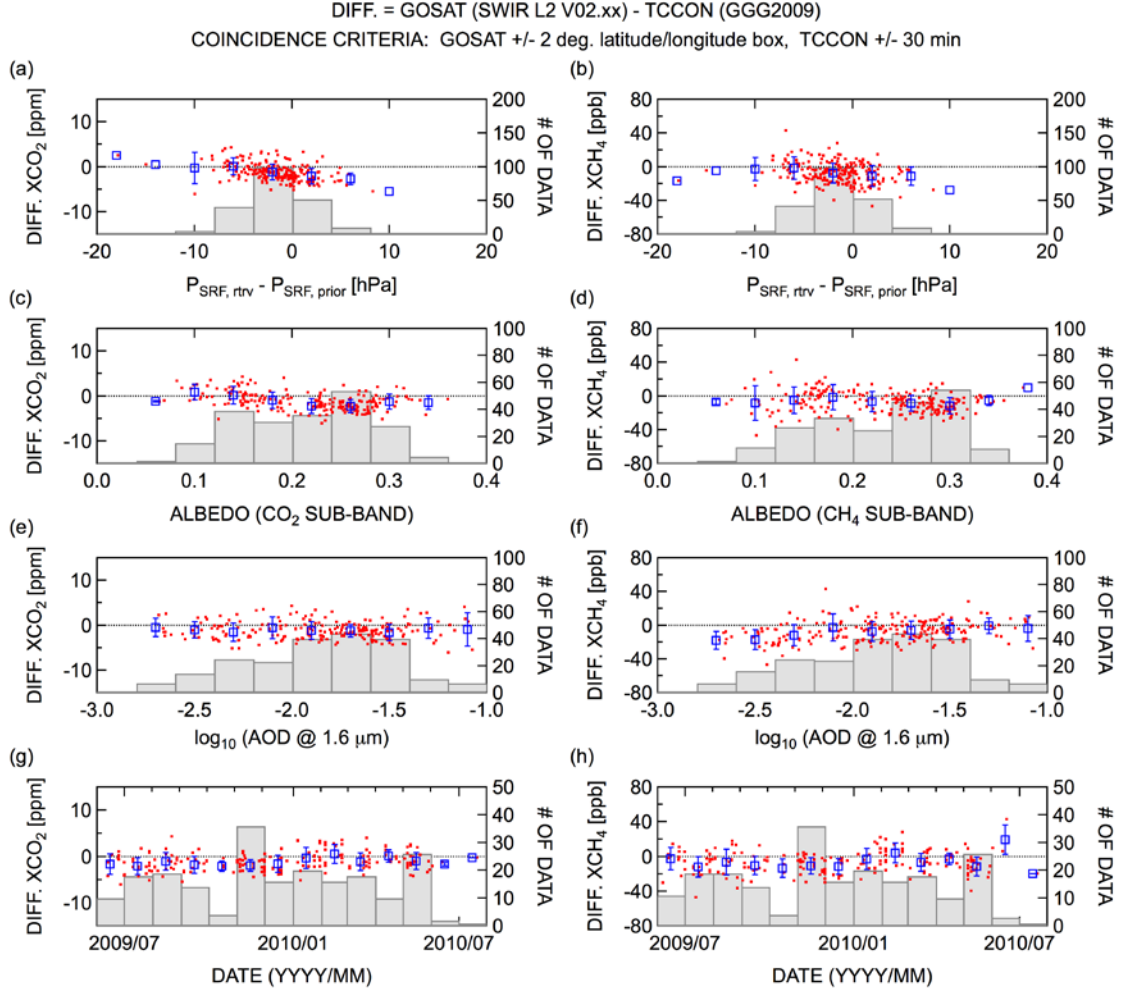
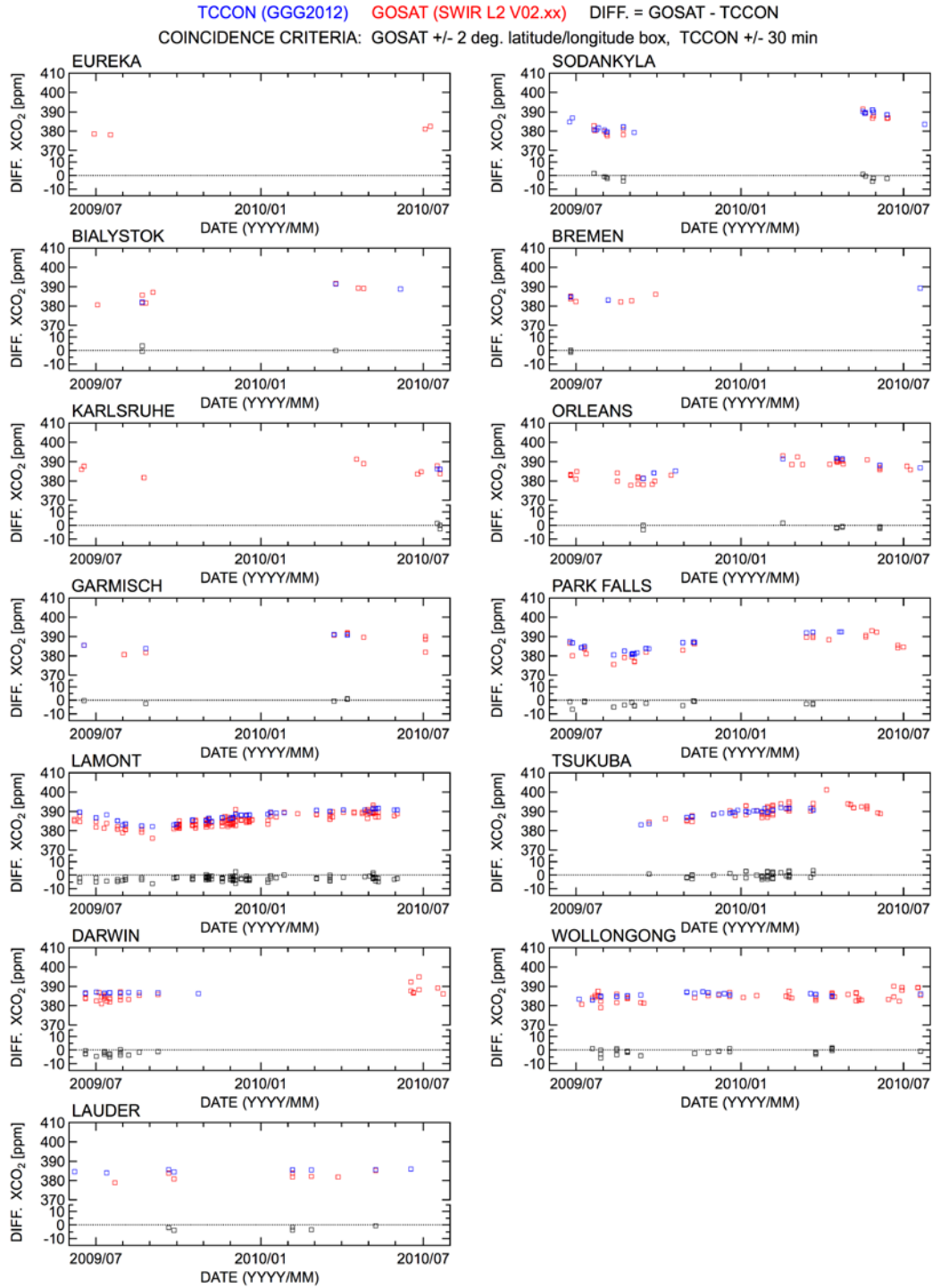


Figure 5. Difference between the SWIR L2 V02.xx and TCCON data (GGG2009) as a function of (a, b) retrieved surface pressure, (c, d) retrieved surface albedo, (e, f) retrieved AOD, and (g, h) time for XCO₂ and XCH₄, respectively. Only the matched data until July 2010 are used. Red dots are the individual results and the average and standard deviation are shown in blue square and vertical bars. Gray histograms show the number of data points contained within each bin.



1

2 Figure 6. Time series of the SWIR L2 V02.xx and TCCON XCO₂ (GGG2012) and their
 3 difference for each TCCON site. Only the matched data until July 2010 are used.
 4 The GOSAT data are retrieved within a ± 2 degree latitude/longitude box centered at
 5 each TCCON site and TCCON data are the mean values measured within ± 30 min of
 6 GOSAT overpass time.

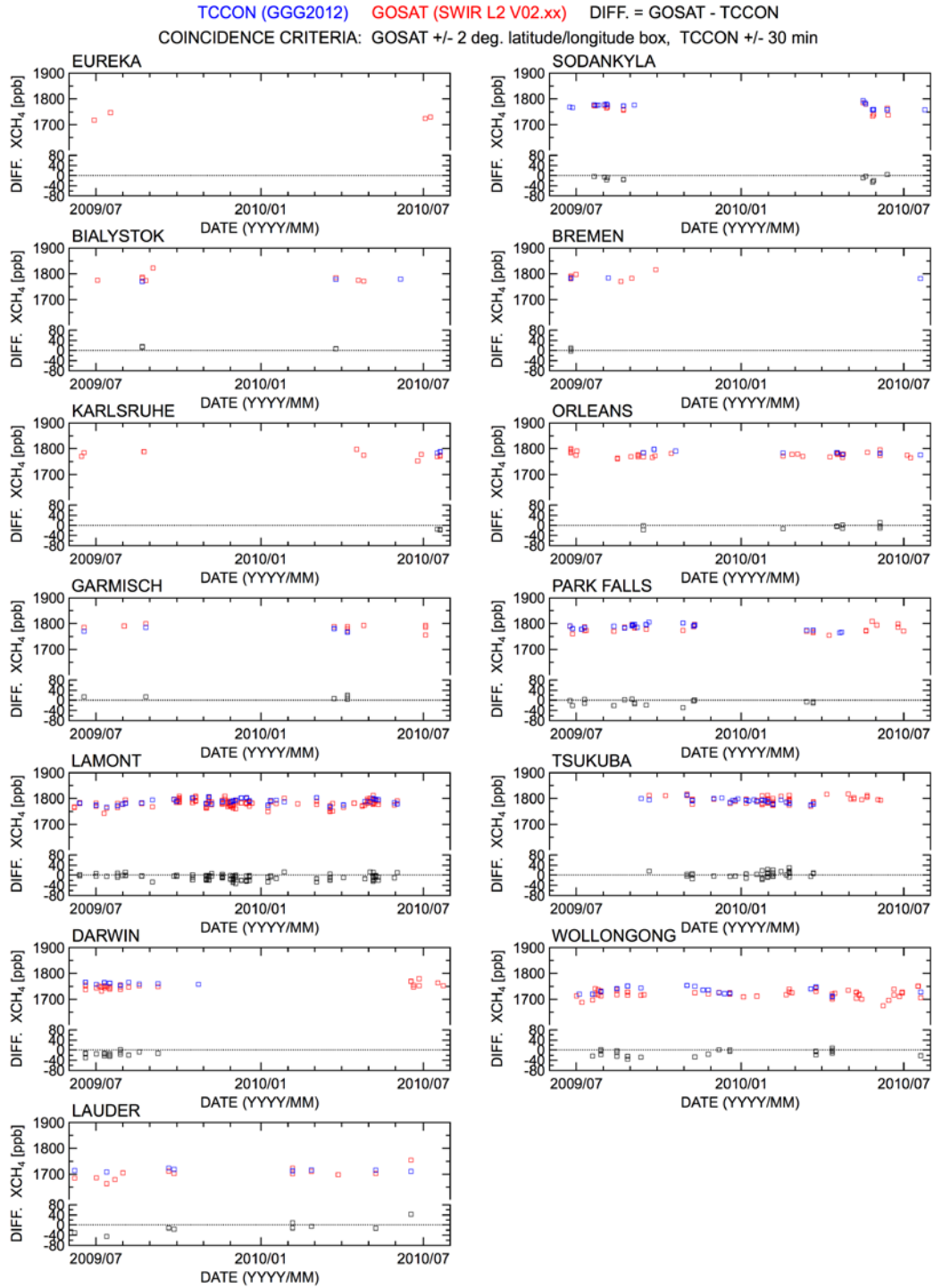


Figure 7. Time series of the SWIR L2 V02.xx and TCCON XCH₄ (GGG2012) and their difference for each TCCON site. Only the matched data until July 2010 are used. The GOSAT data are retrieved within a ± 2 degree latitude/longitude box centered at each TCCON site and TCCON data are the mean values measured within ± 30 min of GOSAT overpass time.

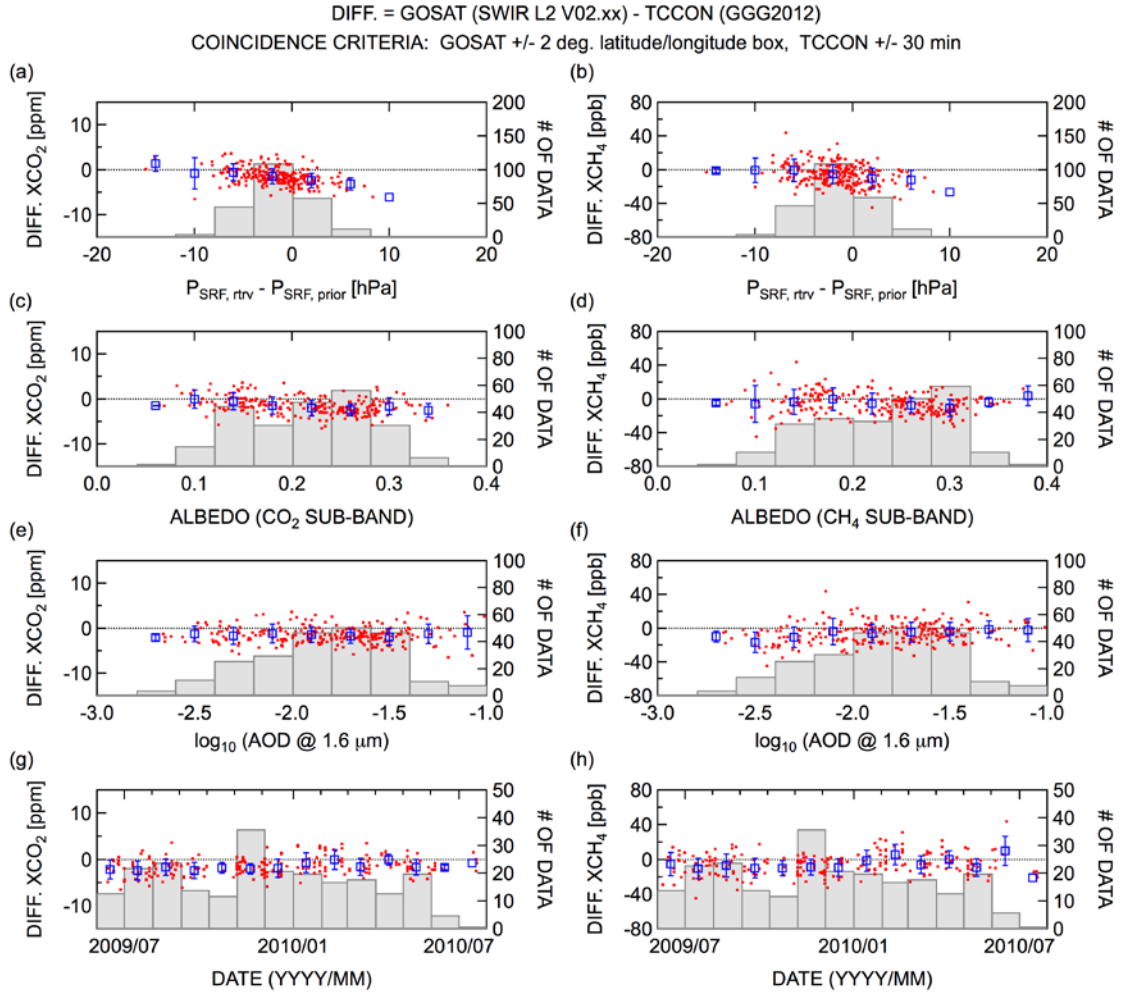


Figure 8. Difference between the SWIR L2 V02.xx and TCCON data (GGG2012) as a function of (a, b) retrieved surface pressure, (c, d) retrieved surface albedo, (e, f) retrieved AOD, and (g, h) time for XCO₂ and XCH₄, respectively. Only the matched data until July 2010 are used. Red dots are the individual results and the average and standard deviation are shown in blue square and vertical bars. Gray histograms show the number of data points contained within each bin.

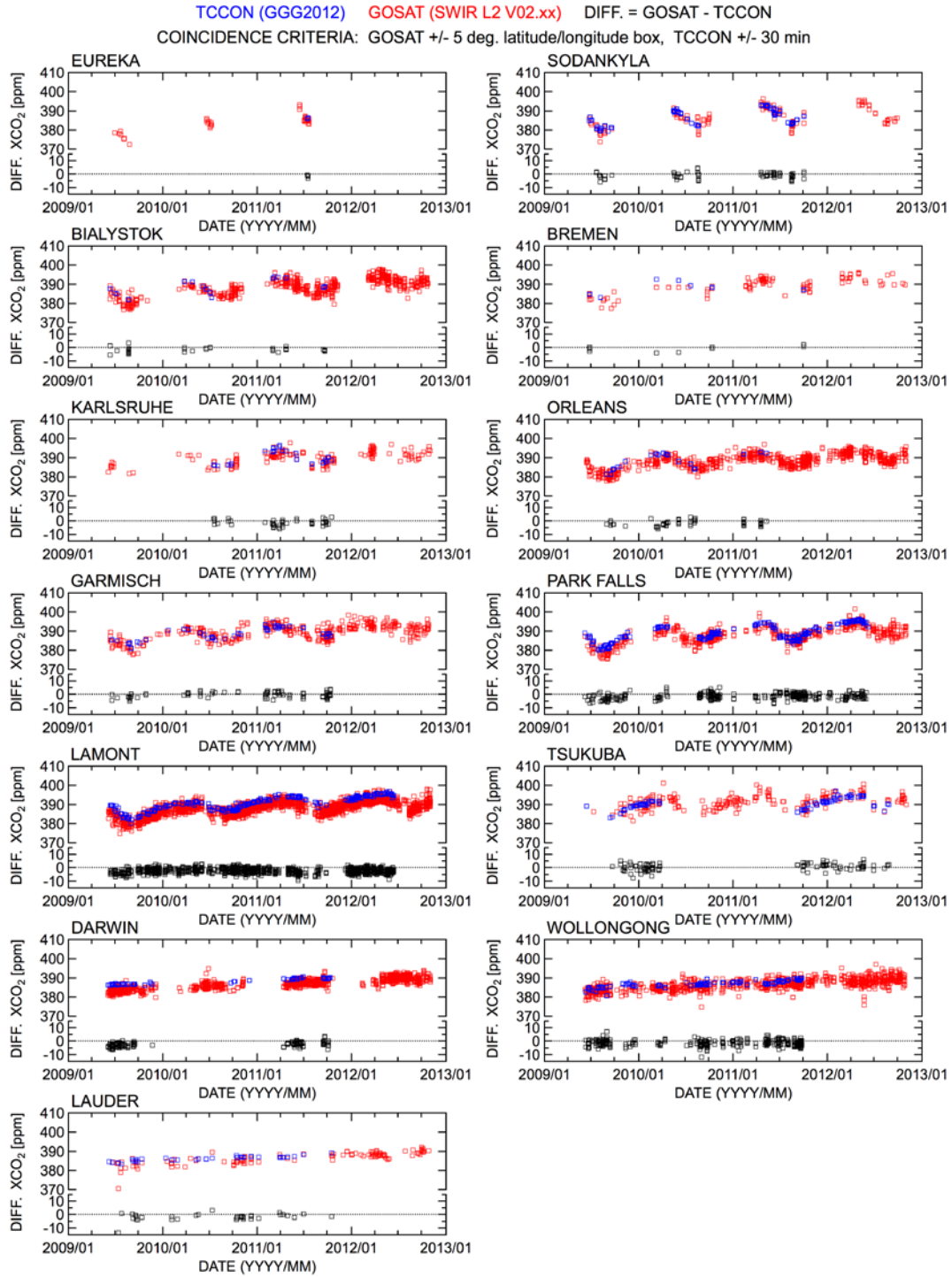


Figure 9. Time series of the SWIR L2 V02.xx and TCCON XCO₂ (GGG2012) and their difference for each TCCON site. All available data are used. The GOSAT data are retrieved within a ± 5 degree latitude/longitude box centered at each TCCON site and TCCON data are the mean values measured within ± 30 min of GOSAT overpass time.

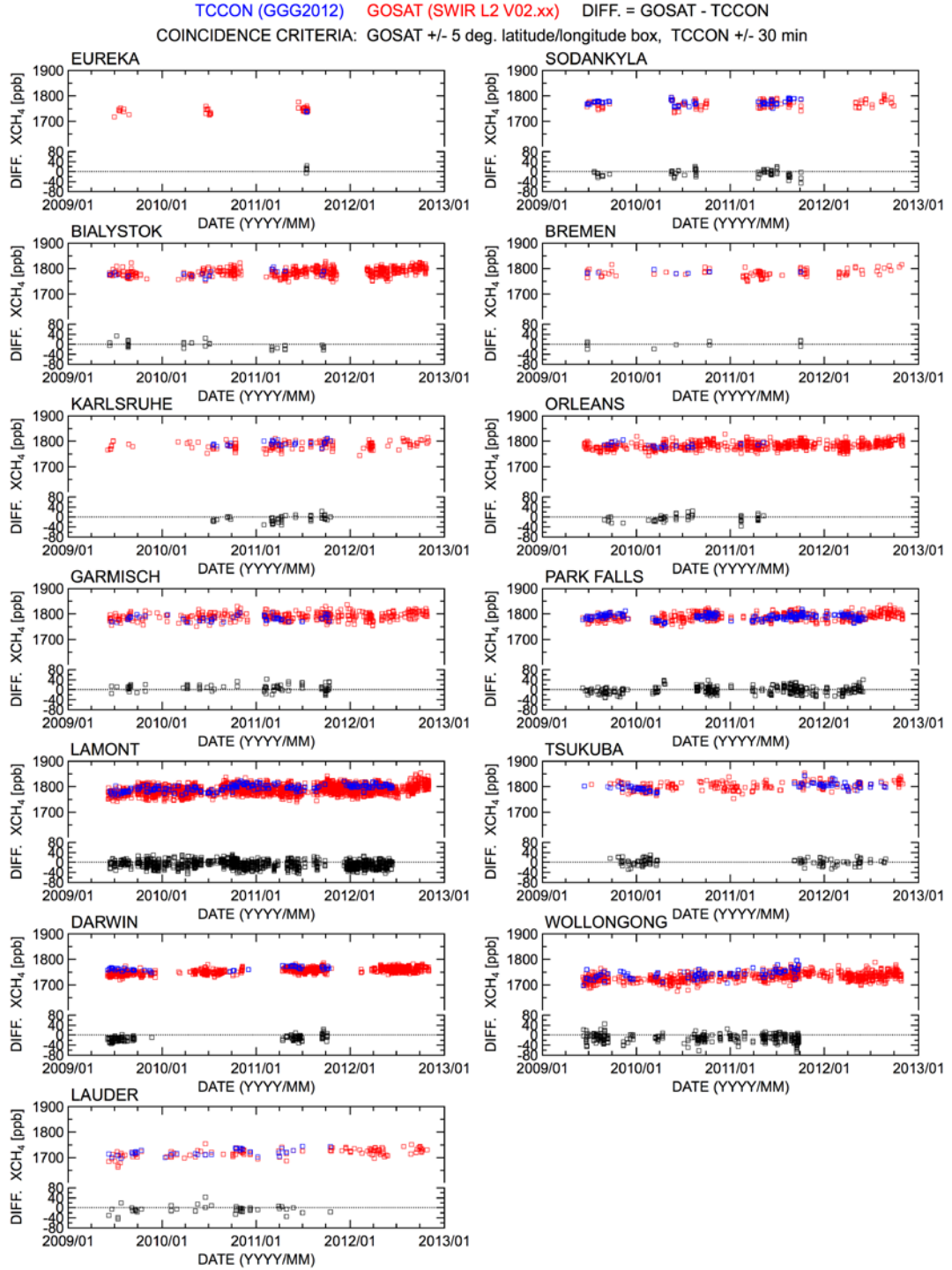


Figure 10. Time series of the SWIR L2 V02.xx and TCCON XCH₄ (GGG2012) and their difference for each TCCON site. All available data are used. The GOSAT data are retrieved within a ± 5 degree latitude/longitude box centered at each TCCON site and TCCON data are the mean values measured within ± 30 min of GOSAT overpass time.

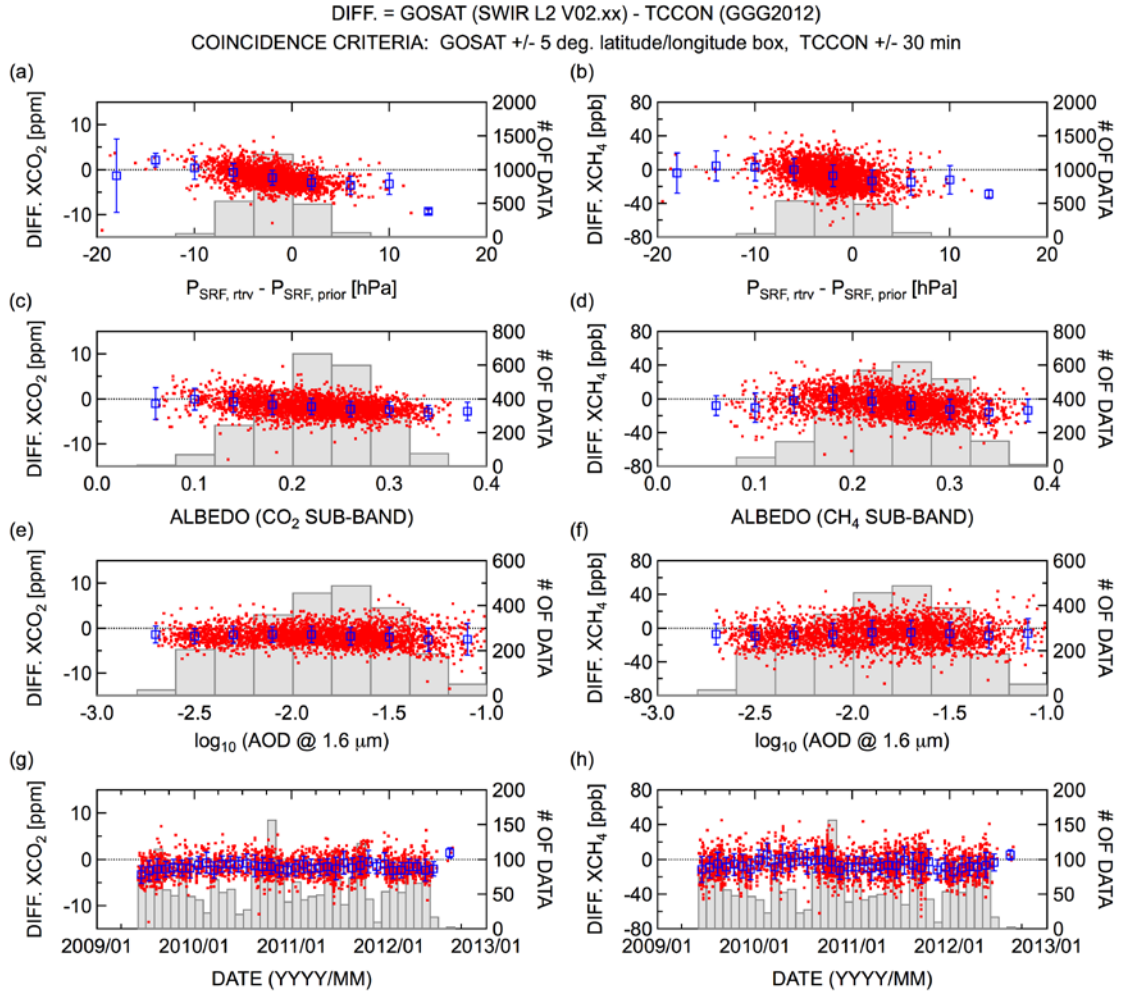


Figure 11. Difference between the SWIR L2 V02.xx and TCCON data (GGG2012) as a function of (a, b) retrieved surface pressure, (c, d) retrieved surface albedo, (e, f) retrieved AOD, and (g, h) time for XCO₂ and XCH₄, respectively. All available data are used. Red dots are the individual results and the average and standard deviation are shown in blue square and vertical bars. Gray histograms show the number of data points contained within each bin.